left, through the diagonals of its own system, and similarly with respect to W_9. Hence there arises a slight ambiguity respecting the strains, as they may go in either way, or partly in one, partly in the other. If, however, the girder be strong enough to sustain the strain, in whichever way it is conveyed, the safety of the structure is secured, and practically a very slight difference in the resulting strains ensues whichever method of calculation is adopted.

MONDAY, JUNE 27, 1859.

JAMES HENTHORN TODD, D. D., President, in the Chair.

J. R. KINAHAN, M.D., read an account of the discovery of certain wooden implements, found in connexion with the bones of *Megaceros Hibernicus*, in a marl-pit in the county of Clare.

J. B. Jukes, M. R. I. A., called attention to the recent observations made by Mr. Prestwich and others, in England and France, the tendency of which is to establish the coexistence of the human race with some of the races of animals now extinct, such as mammoths and bears.

The PRESIDENT read a paper—

ON THE GROUNDS FOR SUPPOSING THAT THE NAME OF THE TRIBE OF ISSACHAR OCCURS IN EGYPTIAN INSCRIPTIONS. BY THE REV. EDWARD HINCKS, D.D.

THE alleged occurrence of the name of Issachar, as of a people in Palestine, in the inscriptions of Rameses III., has been used as an argument against the opinion so generally entertained by recent Egyptologists, that the Exodus did not take place till near the end of the nineteenth dynasty. In the present paper I propose to consider, without reference to the chronological question, whether this reading of the name be admissible. As respects the latter part of the name, I cannot suppose that any objection can be made. It concludes with a double, or sometimes a single K and R. Before these we have an *unfledged bird;* and the question to be considered is, whether this can represent *Iss*, or any sound which can have passed into *Iss;* for though this be the modern pronunciation, grounded on the Masoretic points, it may not have been the ancient pronunciation.

I will endeavour to prove the two following propositions:— 1st. In certain cases, of which this is one, it is admissible to supply a vowel before the consonantal character which begins a word. 2nd. The value of the *unfledged bird* was the double consonant ST. If these propositions be established, nothing more will be required to justify the reading Istakkar, or Istakar, from which Issakar naturally flows. As to the first of these propositions, I must begin with stating that since the publication of my paper "On the Number, Names, and Powers of the Letters of the Hieroglyphic Alphabet," I have been led to alter my views very considerably. So far, however, from returning to the old views, from which I there expressed my dissent, I have gone much further from them. I am now satisfied that the Greek transcriptions of the Ptolemaic age and the Coptic equivalents of hieroglyphic words are still less to be depended on than I then supposed, and that the Egyptian

characters which were not syllabic were *consonantal*, like the Phœnician and Hebrew, as contrasted with *alphabetic*, like the Greek and Coptic. I mean to say that, properly speaking, there were no vowels. What have been supposed to be such were really breathings or semi-vowels. They in some instances indicated the vowels that were to be supplied; but vowels had in every instance to be supplied.

A comparison of the Cuneatic or Assyrian and the hieroglyphic or Egyptian methods of writing, will best show my meaning. The Assyrians had characters representing complete syllables, consisting of two consonants and a definite vowel between them; and they had characters representing incomplete syllables, either a consonant followed by a definite vowel, or a consonant preceded by a definite vowel. A combination of a character representing an incomplete syllable of the former kind, and of a character representing an incomplete syllable of the latter kind, would be equivalent to a character representing a complete syllable. Supposing there be twenty-two distinct sounds in the language, and that each complete and incomplete syllable were to be represented, $22 \times 22 \times 3$, or 1452 complete, and 22×6, or 132 incomplete syllables, would have to be represented. It would be scarcely possible, however, to devise such a number of Cuneatic characters, and it would be absolutely impossible to recollect them. It is, consequently, a matter of necessity that several syllables should in many cases be represented alike, and that many complete syllables should be without representations. For example, בָּח בָּא and the incomplete syllable בַ, might have one character to represent them; and, again, אַבְ, חַבְ, יַבְ, עַבְ the incomplete syllable בְ, and the five corresponding syllables which have פְ in the place of בְ, might have one character to represent them all. Those complete syllables which neither occurred in the inflexions of common roots nor in combinations of preformatives, or of a preformative and an initial radical, might be left without any representatives. The number of syllables that it would be desirable to represent might thus be reduced to less than a quarter of the whole number in existence. The number of characters in use was also limited in another way. The characters originally represented objects, and stood for sounds which were the names of those objects, or signified some action which they would suggest. An incomplete syllable could not, therefore, have any proper representative. Its representative must properly denote some complete syllable resembling this, which was a significant word. For example, the class of ten syllables (eight complete and two incomplete), mentioned above, might have for their common representative a nose, אַף; a similar class with *i* instead of *a* for the vowel, might have for their representative corn about to be reaped, אִב; and another class with *u* for the vowel might be represented by a bird, עֹף.

All this is well established; and I have been strongly impressed with the opinion that the hieroglyphic system of writing is much more likely to have been analogous to this than to that of the Greeks. We know

that there were some decided differences between the Egyptian system and that of the Assyrians. The Egyptians had fewer elementary sounds to express than the Assyrians. Their characters which represent complete syllables represented, generally speaking, three complete syllables, which would be distinguished in the Assyrian system; as the vowel of the syllable might be either *a*, *i*, or *u*. And, again, not only might the representative of two incomplete syllables be used to represent a complete syllable, but one or both of these representatives of incomplete syllables might be added to the representative of the complete syllable; which is never the case in Assyrian. It does not, however, appear to me that any of these differences is inconsistent with there being a general conformity between the two systems in respect to the sounds to be represented. The elements of Assyrian writing are not vowels and consonants, as in the writing of the Greeks; but incomplete syllables, consisting of consonants (including breathings and semi-vowels), preceded by a vowel, or followed by a vowel. I now think that the elements of Egyptian writing were of the same nature, the only difference being that the vowel sounds included in the elementary syllables of the Egyptians were undetermined. While the Assyrians would require six characters to represent the consonant *m*, namely, the representatives of the elementary syllables *am*, *im*, *um*, *ma*, *mi*, and *mus*, the Egyptian would require but two. I propose to transcribe these by –M and M–, using the hyphen to represent an undetermined vowel. The former of these is the transcription of the *owl* or *boat-frame;* the latter is that of the *sickle.* According to this view of the matter, there are no vowels, properly speaking. In my former paper, thirteen years ago, I reduced the number of vowels to a very few. I now admit none whatever. The *leaf* which I formerly took for the breathing, *aleph*, I now consider to be an initial *aleph*, and represent it by A–, restoring that letter to its ancient power; and the *eagle*, which I formerly took for the vowel *a*, I now take for a terminal *aleph* or –A. The *arm*, which I formerly valued as *'Ayin*, I now value as terminal *'ayin*, writing it on the same principle –O. It is the same with semi-vowels. I consider the *quail* or *duckling* to be an initial W, and the *knotted cord* a terminal W; and the pair of leaves to be a terminal Y. Thus I transcribe the name of Ptolemy, as found on the Rosetta stone, by –P, –T, –W, L–, M–, –Y, –S; and I would pronounce this in five syllables, supplying the requisite vowels as follows:—*ipt-aw-lim-ay-us.* The rules for supplying vowels are very simple. When a terminal consonant is preceded by an initial consonant, they are to be made to form one syllable, a vowel being supplied between them, as in the third syllable of this word *lim.* When a terminal consonant is not so preceded, it must have a vowel supplied before it, unless a terminal consonant precedes it, with which it can coalesce. An example of this coalescence occurs in the first syllable *ipt;* and it is possible that the two last syllables may have been pronounced *ays.* If an initial consonant occurs without a terminal consonant to follow it, it must have a vowel supplied after it, and must constitute a syllable by itself. The mode of reading the first syllable of this word which I propose will ap-

pear strange. In like manner I must read the name of Phthah –P, –T, –H, *ipt-ah;* and that of Psamitik, –P, –S, –M, –T, –K, *ips-amit-ik;* all the consonants in these names being terminal. I justify this by the name of the town which the Greeks called Primis. Its hieroglyphic name has been found in inscriptions there, and is –P, –R, –M *ip-ir-im.* It has been handed down to this day by oral tradition, and is now pronounced *Ibrim.* Even in this word, where the second consonant is *r*, the junction of which with a preceding consonant is, comparatively speaking, so easy, the Egyptians prefixed a vowel. Much more must it have been necessary to do so, when the word began with such a combination as PT, which even Europeans find it difficult to pronounce. To complete what I may have to say on the subject of transcription, I will here observe that I should transcribe such a character as the *embattled wall* (or *basket*) by M–N; and if this were followed by a complementary –N, I would use an Italic in place of a Roman capital for this, expressing the remainder of the syllable by a Roman capital, and enclosing the whole in a parenthesis, thus—(M–. –*N*). On the same principle, I should transcribe the word for "life," when written with three characters (O–. *N.*–*KH*) *'unkh;* thus indicating that the first character might represent the whole word. As a general rule, any of the three vowels may be supplied; but Greek transcriptions, Coptic equivalents, and sometimes analogous words in other languages, will often suggest the proper vowel. When these fail, I will supply *e*, as Lepsius has done in similar cases. I came to the conclusion that this was the proper manner of valuing the hieroglyphic characters by *a priori* reasoning, from what I had discovered respecting the Cuneatic characters. I have since tested this conclusion by examining a number of hieroglyphic words, the reading of which, according to the principles here proposed, seems preferable to that which has been heretofore adopted. For example, the fields in which the blessed were supposed to dwell have been heretofore called the fields of *aaru* or *aalu.* Omitting, however, the plural termination, we have in inscriptions of the eighteenth dynasty the forms A–. –A. L–, A–. L – and –A. L–, all of which, supplying the vowel *i* from the analogy of the Greek, I read *ilu* or *il.* The plural termination, sometimes written W–, and sometimes only indicated by the *three small bars,* I take to have been *wi.* The fields *iluwi* were the ἠλύσιον πεδίον of Homer. The form of the Greek word, however it originated, is clearly that of Πηλουσίον, which is the hieroglyphic P–. L–. *pilu.* In a future paper I hope to give other examples, together with a list of the elementary syllabic characters with their values. At present I can only point out some exceptions to this mode of valuing the characters which exist, with what I take to be the reason of their existence. As in the case of the Assyrian characters, those which represent elementary syllables could not have represented these only. They must have represented also complete syllables, and such as were also words. For the very same reason the hieroglyphic elementary characters must also have represented words; and it may be that these words were different from any that were composed of the elementary syllable. For example, the *owl,* as an elementary syllable, denoted –M; but as a word it denoted M–O. The name

of the owl was probably *mu'*, in connexion with which I might make a long digression. All, however, that I need now say is, that the *owl* when accompanied by the *arm*, which was often made to intersect it, and by no other character in the word, was to be read (M–. –O). It had different significations, as "from," *mi'* (compare Heb. מִן, מֵ), and "give," *mu'* [comp. Lat. *mun-us*], or in the imperative *ma'* (Copt. ⲙⲁ and ⲙⲟⲓ). The sound of the *'ayin* was almost certainly that of a nasal, but the Egyptians scarcely distinguished it from *aleph*. Thus the name of the *owl* was reduced to *mu;* and the character was thus read, especially in foreign words, and especially when followed by the *arm*. In other words, the *owl* had, besides its ordinary value (the indefinite syllable – M) a definite syllabic value *mu*, which it admitted in exceptional cases; as, for example, in the names of the country *Mushusha*, and the city *Qarqamusha*. The *boat-frame*, which was a perfect equivalent of the *owl*, had the same values. Of these names, the former is written with the *boat-frame* and *arm* (with special exceptional value *mu*), the *garden*, the *eagle*, the *knotted cord*, the *eagle*, the *garden*, and the *eagle*. The *eagles* are expletive characters, and are to be passed over; the three characters preceding these are SH–. –W. SH–, which should be read *shuwsha* or *shúsha*. The latter name is written with the *knee*, the *eagle*, the *mouth* and *bar*, the *knee*, the *eagle*, the *owl*, the *arm*, the *garden*, and the *eagle*. Omitting the *eagles* and the *bar*, which are expletives, and giving their special value to the *owl* and *arm*, we have Q–. –R. Q–. mu. SH– which I read as above. The former of these words is the Greek Μόσχος, as I stated in my former paper; *usha* is the termination of the nominative singular, answering to ος; *mush* is what the Assyrians (who had no SH in their language, and could not pronounce it) converted into *musk*. They spoke of the country, *Muski*, in their genitive, and of the *Muskaya*, its inhabitants. *Qarqamusha* is another nominative. In Greek it would be written Γάργαμος, like Πέργαμος; but it is not found. In Assyrian it is written *Qarqamusk*. Both these names, as well as many others of places in Northern Syria and to the northward of it, occurring both in the Egyptian and in the Assyrian texts, are, beyond all question, Indo-European. In my former paper I committed an error in identifying *Qarqamusk* with Κιρκήσιον. It lay far to the north of this city, and on the opposite bank of the Euphrates. This is one instance of a terminal consonant having a special value in which it is initial; and we can have no reason to suppose that it is the only such instance. The *basin*, –K, has for its expletive the *eagle;* its name was, therefore, K–A. It occurs in the proper name I am considering, sometimes twice, and sometimes only once. I see no way of accounting for this but by supposing that, though generally terminal, it might, like the *owl*, have a special value in which it was initial. It has this value also in the name of Canaan, where it is initial; and this determines its special value to be *ka*. As for the character which begins the word, it has been proved to contain the same consonant as the *long serpent*. It has been considered of late as its homophone; but, according to the principles here laid down, it is more natural to consider the one as an initial consonant, the other as a terminal

one. Now, the *long serpent* begins the name of Tyre, where it must needs be initial; it is, therefore, a fair inference that the *unfledged bird* represents the same consonant terminal. Calling, then, this consonant for the present Z, I say that, according to probability, founded on the analogy of similar characters, this name may be transcribed –Z, –K, ka, –R, and read *iz-ak-kar;* or, if the second *basin* be omitted, *iz-ak-ar.* It is no objection to this that the *unfledged bird* is followed by a *small vertical bar,* which, according to most Egyptologists, is to be sounded as a vowel. I do not go so far as Baron Bunsen, who, in a review of my paper of 1846, at the end of the first volume of the English translation of his "Egypt's Place" (in which, by the way, he misrepresented my line of argument, and took no notice of the proofs on which I chiefly relied), affirmed that this bar indicated that the character terminated a syllable. I do not say that a character followed by that bar *always* terminates a syllable. It would naturally indicate the contrary; it stands for a character which, with the object represented, would compose the name of that object; but, being an expletive character, it is often to be omitted, especially in proper names. The *mouth* with the *small bar* is generally to be read –R when medial; and I believe that it should generally be so read when initial; as in the name which has been read *Rebo,* which I read *Arba,* the Arabs. I now pass to my second proposition—that the value of the consonant which, when initial, was represented by the *long serpent,* and, when terminal, by the *unfledged bird,* was ST. In my former paper I showed that it represented the Hebrew *Tsaddi* or *Zayin.* Now, I have elsewhere proved that the value of the Assyrian letter corresponding to the latter of these had the value *zd;* and that which corresponded to the former had the strengthened sound of this; so that it would represent the Arabic *sad* followed by *ta* or ﺼﺕ. The Egyptians did not use these rough combinations; and what they would naturally substitute for them would be ST. It is thus probable that this was the value of those characters; and the probability is increased by the following coincidences, though they do not place the value beyond question. The word which signifies "to hate" is found written with (M–, –*S*), T– and (M–, –*S*) Z–. This is just what would happen if Z were = ST. I read the word *mis-ti;* and consider it to be connected with μισέω. The retention of the σ, which, if it had originally stood alone between two vowels, would have been dropped, and the length of the vowel before it, are both accounted for by supposing σ to have been originally στ. Again, the word "to scatter" is written with (Z–, *R*), which is transcribed by Σωρ. Here, again, the retention of the σ (which, if it had stood alone, would, according to analogy, have been changed into the aspirate) points to an earlier form Στορ; as the pronoun σύ is derived from an earlier στύ. But the Greek root of the same signification is στορ (whence στόρνυμι, &c.) in which the double consonant is retained. There is another character which is used to express the same complete syllable; and it appears to me that in this the *mouth* should be read L. This, at least, seems to be its value in ancient inscriptions. I would transcribe it by (Z–, –*L*). I speak of the

character which is supposed to represent a *bundle of reeds*. As a root, this seems to signify "to clothe or wrap up," and so may be connected with στέλλω. I repeat, that I do not consider these analogies as proofs. I only regard them as heightening a previously existing probability. But even if it should turn out that the consonantal value of this character was some other modified sibilant, the syllable *is* or *iss* might still be derivable from that with a vowel supplied at its beginning. Enough, I trust, has been said to show that the reading *Issakar* is not a mere arbitrary one, but that arguments which appear to have some weight may be adduced in its favour. Whether or not this opinion is sound, must be decided by others. I have no doubt that the truth will ultimately prevail.

There are many points of great interest to which I have in this paper merely alluded; at a future period I hope that I may discuss them at greater length.

Sir W. R. Hamilton communicated the concluding part of his paper "On certain Equations in Quaternions, connected with the Theory of Fresnel's Wave Surface."

W. R. Wilde, M. R. I. A., exhibited:—1. The head of the old Connaught ox, as an illustration of his remarks made at a former meeting. 2. Some gold ornaments found recently in the county of Kildare, at Ballinderry, near Enfield, and a number of bones of horses and other animals discovered at the same time. 3. An ancient crozier, found in the county of Cavan, and known as the "Crozier of the O'Bradys." 4. A MS., called the "Plunket MS.," and now the property of the Earl of Fingal. Mr. Wilde gave a description of the MS. and its contents.

Sir W. R. Hamilton handed in a letter, addressed to him by Mr. Graham, of Markree Observatory, containing observations on Donati's Comet.

Markree Observatory, Colloony, Nov. 6, 1858.

Dear Sir William,—At the conclusion of our series of observations of Donati's Comet I was encouraged, by the length of arc described since the first discovery, to undertake the calculation of the orbit, in the hope of being able to settle the question of ellipticity to my own satisfaction. The observations selected, freed from aberration and parallax, were—

	Greenwich M. T.	Rt. Ascen.	Declin.
1858, June, . . .	8·35573 . . .	141° 15′ 38″·7 . . .	+24° 27′ 42″·7
„ August, . .	25·52010 . . .	156 30 21 ·2 . . .	+33 6 21 ·4
„ October, . .	16·28287 . . .	243 58 1 ·7 . . .	−16 18 41 ·2

Made at Florence, Washington, and Markree respectively.

I first attempted to represent them by a parabola, and obtained the following set of elements:—

T = 1858, Sept. 29·97161 Greenwich M. T.
π = 294° 18′ 39″·5 } Mn. Eqx.
Ω = 165 15 52 ·0 } 1858·0
i = 116 56 26 ·3
$\log q$ = 9·761856.